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In This Issue:

Observations On Stubborn And Other Diseases of Citrus In Morocco in 1959

Temperatures In A Small Polyethylene Covered Greenhouse

Citrus Rootstocks

Pros And Cons of Soil Testing (Analysis) As A Guide To Citrus Fertilization

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VOL. 42 — NO. 8 AUGUST, 1961 BARTOW, FLORIDA

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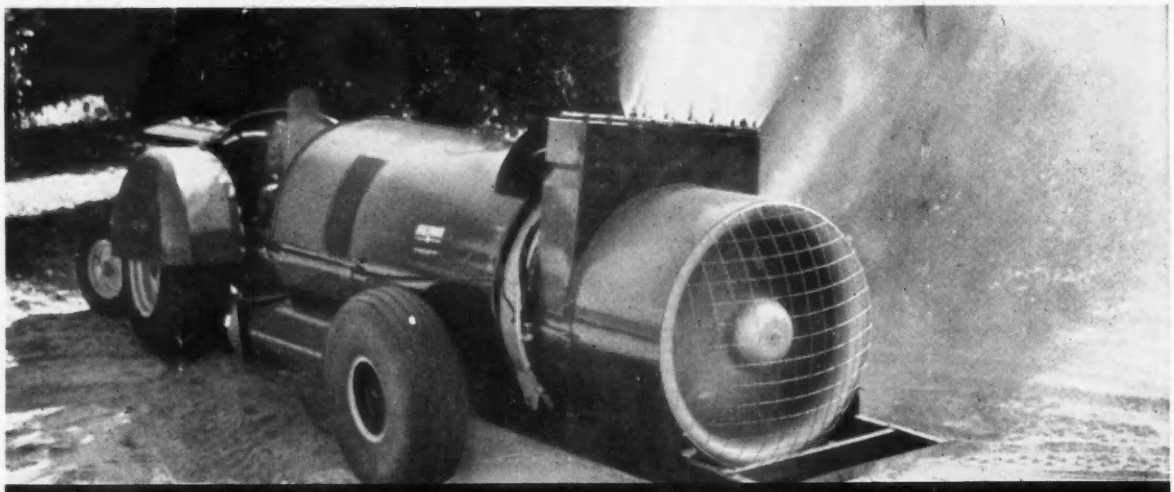

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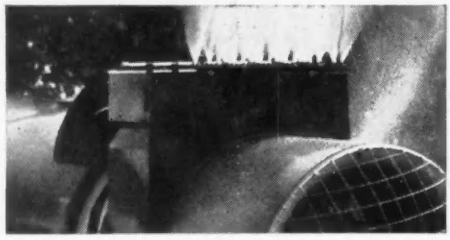

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ORTHO Ethion 4 Flowable	**Dosage:** 40 ozs./500 gals.	
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Note: In recent years, minor pests, including Aphids, Mealybugs, Fruit Worms, Black Scale, have become increasingly important to control. Parathion in the post bloom spray prevents the build-up of these pests. If preferred, ORTHO Malathion may be substituted.

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ORTHO Zineb 75 Wettable	**Dosage:** 5 lbs./500 gals.	

Note: Check with your local ORTHO Fieldman for other available phytonomic oil sprays. Florida Red Scale is best controlled between July 15 and July 31. If the interval between the Post Bloom Spray and the Summer Spray is extended to an aerial application of ORTHO Trithion 4 Flowable or ORTHO Trithion – Sulfur dust formulations may be needed for control of rust mites and spider mites prior to the Summer Spray.

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ORTHO Tedion 25 Wettable	**Dosage:** 2½ lbs./500 gals.	**Controls:** Citrus Red Mite, Texas Citrus Mite, Citrus Rust Mite, Fruit Russet
Chlorobenzilate 25 Wettable	**Dosage:** 2½ lbs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: In groves where greasy spot is a problem, protection of the late summer-early fall flush may be necessary. ORTHO PHALTAN 50 Wettable and ORTHO Copper 53 Fungicide combined with ORTHO Spray Sticker are recommended for this use. Consult your local ORTHO Fieldman for information on the proper rates and timing.

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Observations On Stubborn And Other Diseases Of Citrus *In Morocco, 1959*

. . . BY . . .
J. F. L. CHILDS[2]
AND
J. B. CARPENTER[3]

Introduction

Symptoms of a citrus disorder variously known as stubborn disease, little leaf, and acorn disease, as well as by other names, have been recognized in Morocco since 1949 (4). Because of the controversial nature of the disorder, its symptoms and its cause, the Moroccan government asked the International Cooperation Administration of the United States Department of State for assistance in determining the nature and extent of the problem.

As a result the authors were sent to Morocco to study the stubborn disease problem and from November 18 to December 5, 1959 examined citrus trees in all stages of the disease in six of the seven principal citrus-growing districts of Morocco.

Before reporting the authors' observations on citrus diseases in Morocco, and as an introduction to them, it seems desirable to present a short history of the disorder now generally called stubborn disease, and an outline of the symptoms, and to describe briefly citrus culture in Morocco.

A Brief History of Stubborn

In 1930 Reichert (14) and later Reichert and Perlberger (17) described a disease of budded sweet orange (**Citrus sinensis**) trees in Palestine that they called "little leaf[4]." The "little leaf" symptoms reported by Reichert were small leaves, multiple buds, short internodes, off-season blooms, stunted growth habit, and misshapen fruit.

In 1944 Fawcett, et al. (10) reported a disease of the same symptoms on sweet orange trees in California. It was termed "stubborn disease" because the stunted and unproductive trees did not respond to corrective treatment (7, 8, 9), such as top-working with budwood from healthy-appearing, productive trees. In fact, the new tops developed symptoms identical with those exhibited by the removed old top. The abnormal shape of some of the fruits, described as acorn shape (10), was a notable symptom of the stubborn trees.

About 1949 Chapot noticed these symptoms on sweet orange trees in Morocco. His identification of the disease was confirmed by A. A. Bitancourt, L. J. Klotz, and J. F. L. Childs, who visited North Africa at various times between 1949 and 1957. In 1956 Chapot found typical symptoms of stubborn, particularly fruit symptoms in Algeria, Syria, Lebanon, and Turkey (3, 4). One of the fruit symptoms noticed by Chapot, and previously observed in Morocco, is best described as "stylar-end greening" or "color inversion" (4); a color transparency of this symptom was sent to Childs in 1956.

At the time of the 1957 Citrus Virus Conference at Riverside, California, stylar-end greening was observed on a stubborn Trovita oranges tree in Coachella Valley, California and Chapot showed color transparencies of this symptom taken in the Mediterranean area. At that time Chapot (3, 4) and Carpenter (1) reported studies that emphasize the similarity of stubborn disease in Morocco, other Mediterranean countries, and the United States.

Published evidence that stubborn is a virus disease consists of an experiment reported by Fawcett (7) and by Fawcett, et al. (10) in which apparently stubborn-free budwood devel-

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1 The hospitality of government officials and citrus growers in Morocco is gratefully acknowledged, and appreciation is expressed to the following persons for their assistance and cooperation in expediting the survey: Dr. N. El Ghorfi, Chief of the Agronomic Research Service of Morocco; Mr. H. Chapot, Chief of the Citrus Section, Agronomic Research Service of Morocco; Mr. H. Brent, Chief of the U.S.O. Mission to Morocco; Mr. G. Whitman and Mr. J. P. Emerson of the Food and Agriculture Section, U.S.O.M., Morocco; Mr. H. Watenpaugh of the Soils Section of U.S.O.M., Morocco, and Dr. L. J. Klotz, University of California, Riverside, California. Special recognition is due Dr. J. Bove of the Institut Francais de Recherches Fruitieres, for his superb translation of technical discussions.

2 Orlando, Florida.
3 Indio, California.

4 Reichert afterwards considered 'little leaf" disease synonymous with xyloporosis (15) and elected to use the latter name for both disorders. Thus the name xyloporosis may have more than one meaning depending on the observer.

5 Trovita is a seedling of Washington Navel orange, first grown at Riverside, California Citrus Experiment Station in 1915 (11).

oped typical symptoms when worked on 14 infected trees.

Citrus Culture in Morocco

The visit to Morocco was timed to coincide with the harvest of Washington Navel oranges, because stubborn disease symptoms are most readily recognized in that variety. Traveling by autombile, the survey party[6] visited commercial citrus orchards in the vicinity of the following towns: Rabat, Casablanca, Mechra Bel Ksiri, Sidi Slimane, Sidi Kacem, Meknes, Fes, Beni Mellal, Marrakech, Agadir, and Taroudant, and the experimental plantings at experiment stations near Rabat, Sidi Slimane, Ain Taoujdat, and Marrakech. The citrus area of Oujda in northeastern Morocco was the only one of appreciable size not visited.

Citrus orchards in Morocco are on irrigated alluvial soils ranging from sandy loams to loamy clays and sour orange (**C. aurantium**) is the predominant rootstock. Cultural practices are rather similar throughout Morocco. In the older plantings trees were spaced about 23 x 23 feet, but many recent plantings are closer (20 x 23, 30 x 20, and 10½ x 23 feet). Average production is 8900 pounds/acre, but well-managed orchards may produce 13,000 to 18,000 pounds/acre and a few orchards produce 26,000 to 36,000 pounds/acre (4). The 1959-60 citrus crop for Morocco is estimated as 10,144,000 90-pound boxes[7]. For comparison, Florida's average per-acre production of oranges is approximately 32,400 pounds/acre, although a few orchards produce 80,000 pounds/acre.

The principal varieties of citrus grown in Morocco are as follows: Washington Navel and Thomson Navel (early oranges); Hamlin, Cadenera, common (seedy), and Washington (grosse) Sanguine (mid-season oranges); Valencia late, Vernia (late oranges), total 106,253 acres; Clementine, Wilking and Willow Leaf (mandarins) total 10,873 acres; grapefruit, principally Marsh, 3953 acres; and lemons, Eureka and others, 2471 acres. This amounts to 123,550 acres, 74,130 acres of which are producing fruit (1959 figures)[7].

Observations On Stubborn Disease In Morocco

Examination of stubborn trees of as many varities of citrus as possible and in as many locations and environments as time allowed was the main purpose of the trip to Morocco. Other diseases were observed however, and are discussed briefly later.

Symptomatology of Stubborn

The symptomatology of stubborn disease is confused and citrus virologists are not wholly agreed on the diagnostic significance of the various associated abnormalties. Consequently it seems desirable to outline the abnormalties on which citrus trees were judged to be affected with stubborn disease in Morocco.

Tree Shape: Trees are stunted, sometimes flat-topped, and twigs commonly exhibit short internodes, giving a dense or "bushy" appearance (Fig. 1) to the tree.

Leaves: Leaves are commonly small, cupped or boat-shaped, with rounded tip, and are often observed standing upright, with dry or leathery appearance (Fig. 1).

Bloom: A few out-of-season blooms are usually present in the fall and winter.

Fruits: Among the normal-appearing fruits there are few to many very small fruits, a few acorn-shaped fruits (thick rind at stem end, thin rind at stylar end, Fig. 2), sometimes others with rind malformed, thicker on one side of the fruit, and occasional fruits with curved columella (Fig. 3). Navels of navel oranges are closed more or less completely, taste is sometimes abnormal to bitter, and stylar-end greening (reversal of the normal order of color development in ripening fruit (Fig. 4) such that the stylar end remains green after the stem end of the fruit has become orange colored) occurs instead of normal ripening. Stylar-end greening is associated with stubborn disease in Morocco, but proof that it is a valid symptom of stubborn has not been established. Acorn-shape of the fruit is the only symptom universally accepted as a valid indication of infection by the stubborn virus. Blue (blue-gray) albedo has been described as a symptom of stubborn, but the occurrence of this symptom is erratic and is influenced by certain chemical treatments (1), so that evaluation of its significance is difficult at this time. In some Moroccan orchards relatively large numbers of small fruit with blue albedo were found.

Severe Symptoms: A citrus tree severely affected by stubborn virus is stunted and dense (bushy) owing to the short internodes. The leaves are small, cupped, rounded at the end, and leathery-appearing, and tend to stand upright. Out-of-season blooms are typically present but are not always conspicuous. Many fruits are small and some may be acorn-shaped or malformed. Fruit misshapenness varies from tree to tree, year to year, and perhaps with the climate. At the time of "color-break" some fruits become orange colored at the stem end first, leaving the blossom end green (stylar-end greening). "Color breaking" at the stem end is not the result of the position of the fruit on the tree or its orientation, that is, stem-end up or down or horizontal. In time, the green color disappears from the stylar end and then the fruits cannot be distinguished from fruits that colored normally.

Mild Symptoms: A mildly-affected tree is not noticeably stunted, but it may be small for its age; nor is it bushy. Most leaves are normal, but on one or more branches the leaves and fruits may have pronounced symptoms and one or more long, unbranched sprouts may extend above the crown of the tree. The leaves often stand vertically and appear to be sheathing the sprouts. Out-of-season blooming may be present but is not conspicuous. Small fruits or those with blue albedo are usually present, but are not conspicuous. Malformed and acorn fruits may be found on mildly-affected trees, and greening fruits are commonly found on them in season.

Trees Without Obvious Symptoms: Trees without obvious symptoms may be infected with stubborn virus.

Stubborn Symptoms on Citrus Species and Varieties in Morocco

Symptoms of stubborn disease were observed on the following varieties of sweet orange: Washington Navel, Valencia, Thomson Navel, Washington (grosse) Sanguine, Hamlin, Cadenera, Portugaise, Surprise Navel, Beni Selman, and Petit Jaffa (principally on the basis of tree shape, leaf symptoms, and stylar-end greening); very few acorn fruits were found possibly because of the immaturity of most fruits. Symptoms strongly suggestive of stubborn were seen on Marsh grapefruit (**C. paradisi**). Stylar-end greening only was observed on mandarins (**C. reticulata**), Clementine, Willow Leaf, Sanguine, Temple, Sunki, Wilking, and Dancy; on sour orange seedlings; on Kalpi lime (**C. aurantifolia**) seedlings; and on a citron (**C. medica**) seedling.

The following species and varieties showed no recognizable fruit symptoms and no foliage symptoms: Lemon

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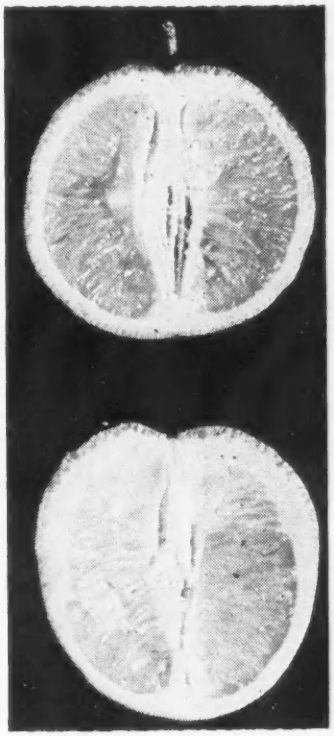
[6] Members of the party were Mr. H. Chapot and Mr. J. Cassin of the Citrus Section, Agronomic Research Service; Mr. Paul Rieuf, Pathology Laboratory, Agronomic Research Service, working in cooperation with the Moroccan government; Mr. J. Bove, Laboratory of Biochemistry, Institut Francais de Recherches Fruitieres, Paris (France); Mr. G. Morel, Laboratory of Plant Physiology, Institut National de la Recherche Argonomique, Versaille (France); Dr. G. Ruggieri, Director of Citrus Experiment Station, Acireale, Sicily (Italy); and Mr. S. Ghazili, Citrus Experiment Station of Tripoli (Lebanon). The group was joined from time to time by government officials and growers.

[7] Data from Citrus Growers Association of Morocco, by letter from H. Chapot.



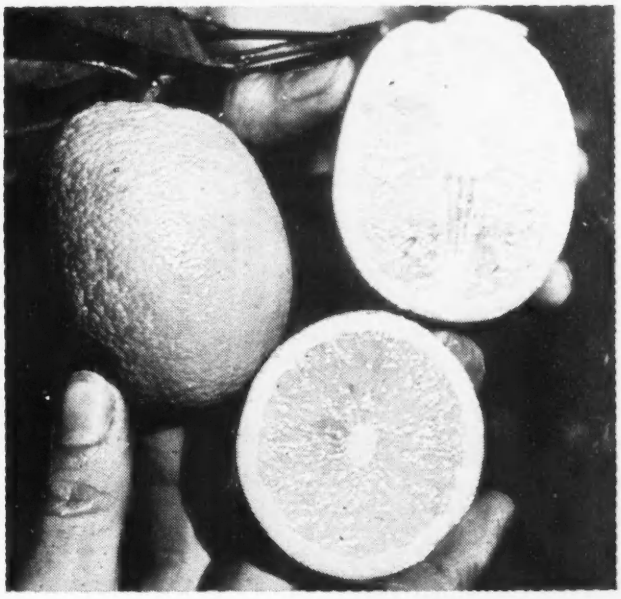


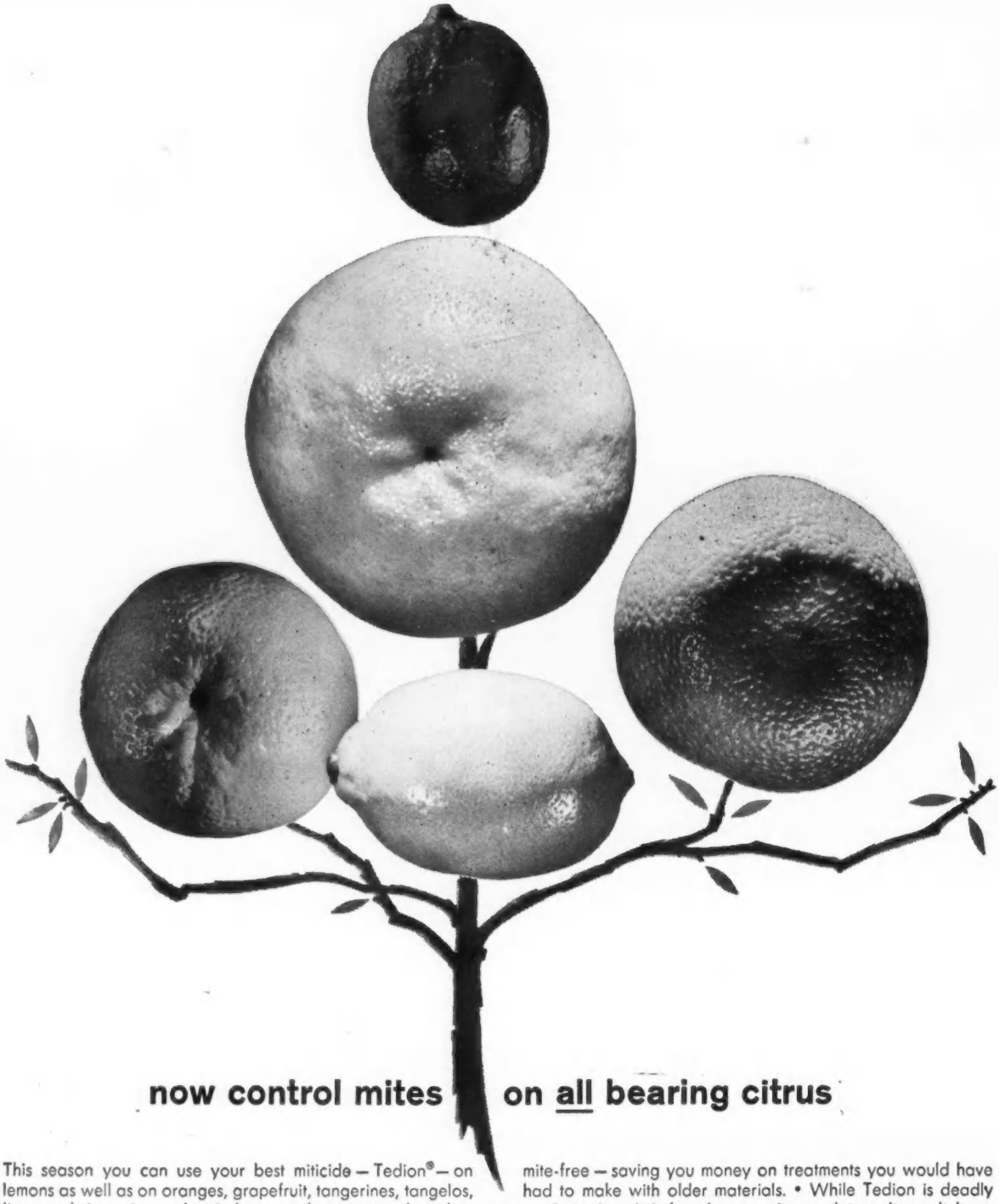
Figure 1. Washington Navel orange tree on sour orange rootstock, 17 years old, and severely stunted. It has all the symptoms associated with stubborn disease.

Figure 2. Normal sweet orange fruit above and an acorn-shaped fruit below, in longitudinal section.

Figure 3. Lopsided fruits; note the curved columella of the one on the right.

Figure 4. Washington (grosse) Sanguine, sweet orange fruits; note the green color at the stylar end of the three fruits on the right.

(Continued on Page 12)



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Pros And Cons Of Soil Testing (Analysis) As A Guide To Citrus Fertilization

. . . BY . . .

DR. O. C. BRYAN*

Although soil testing is used in many industries such as engineering and road construction, the major purpose in agriculture is to secure dependable and scientific information regarding soil nutrients. When properly interpreted, this information is of major importance. Several sciences are involved in the techniques of soil analysis, but the chemical approach is employed to a greater degree than the other sciences.

Time will not permit a discussion of all of the techniques involved, but this is not necessary even for the farmer. Soil analysis or testing is not merely a matter of determining what nutrients are critically deficient for plant needs. Many records show that what is ample for one soil may be deficient in another.

Suffice it to say that after years of study using many reagents and methods, soil testing has progressed to the degree that a chemist can determine with reasonable accuracy and dependability (1) the total, dilute acid and salt extractable nutrients, (2) which nutrients leach readily, (3) which ones are fixed and accumulate and (4) which nutrients combine or react with the soil and or other nutrients creating deficiencies, nutrient strain, antagonisms and other changes.

Records indicate that no one chemical reagent is best for the extraction of all nutrients. The commonly used acetate is popular and with good techniques, consistent results can be secured; yet this reagent often extracts more of some nutrients and less of others than plants are able to absorb, and citrus is no exception. The best reagents and refined methods will not compensate for errors and incompleteness in collecting samples. Special mention should be made regarding the mass of data that reveal no relation between amounts present to soil and crop needs.

The real crux in modern testing centers around determining an optimum nutrient balance having a minimum of antagonism and a maximum crop response. Numerous records indicate that nutrient strain and antagonism are often more important in practice than critically low levels of nutrients. Regardless of the data secured and the extracting reagent used, soil testing data can be only of an academic nature unless they have been calibrated with the crop and soil involved. The absence of properly calibrated data has seriously limited and will continue to limit the use of soil analysis as a guide to efficient fertilization, and citrus is no exception. The wide range of citrus soils in Florida makes this a major problem for all technical workers.

In the absence of calibrated data, attention is called to the paper printed in the September 1958 issue of The Citrus Industry dealing with Optimum, Deficient and Toxic Concentrations of Plant Nutrients in Lakeland Sand. Although the principles presented in this paper are somewhat general, they are fundamental and apply to many Florida soils, especially the sandy soils where intensified fertilizers are used.

Numerous records show that a soil may contain ample amounts of nutrients and yet be unfavorable for their utilization. It is not uncommon to find deficiency symptom patterns of a nutrient in citrus growing on soils

*Technical Director, Soil Science Foundation, Lakeland, Florida.

TABLE I-A

RELATIVE AMOUNTS OF AVAILABLE PLANT NUTRIENTS AT 0-6 AND 0-12 INCH SOIL DEPTHS (LAKELAND SAND)

Short Research Grove Samples Collected January 17, 1961

(Data Represent Averages of Pounds Per Acre for Each Nutrient)

Plot No.	Treatments*	Depth Inches	pH	Calcium	Magnesium	Nitrogen	Phos. Acid	Potash	Manganese	Copper
21, 45	Standard Check Plots	0-6	6.3	872	229	14	105	67	8	8
59	10-3-10 (11.2 lb. per tree)	0-12	6.2	1304	335	28	189	121	10	11
5, 30	Std. w. 2/3 less Nitrogen	0-6	6.3	864	220	5	122	58	5	8
55	in Nov. and Feb.	0-12	6.2	1344	316	11	166	115	9	11
9, 47	Std. w. 1/3 less Nitrogen	0-6	6.5	872	217	8	110	58	6	6
61	in Nov. and Feb.	0-12	6.3	1400	351	20	186	103	11	9
8, 46	Std. w. 2/3 more Nitrogen	0-6	6.1	864	227	20	115	69	7	10
60	in Nov. and Feb.	0-12	5.9	1392	361	36	212	118	11	18

*Standard fertilizer consisted of 10-3-10-3.3-.7-.25-.4-.2 (N-P_2O_5-K_2O-MgO-MnO-CuO-ZnO-B_2O_3), respectively, appied in the following manner: 40% of annual need in November and 30% each in February and June. Ten percent of the Nitrogen in the Standard was derived from insoluble organic sources, and the remainder derived equally from Ammonia and Nitrate Nitrogen. The Phosphorus was derived from super phosphate and Potash from sulphate and muriate of Potash. The secondaries were derived from sulphates and borates.

Comments: The above data show that the 0-12 inch soil depth contains 50 to 100 percent or more available nitrogen, phosphoric acid, potash and copper per acre than the 0-6 inch layer. This was true under a wide range of fertilizer treatments. Calcium and magnesium seem to be more concentrated in the 0-6 inch depth than the other nutrients in this record.

containing liberal amounts of all nutrients. Obviously, soil analysis should go beyond a determination of critically low nutrients.

Special attention is called to the data in Table I (A and B) showing the available nutrients in a group of upland citrus soils during January and February, after the fall fertilizer applications had been made. These data show the range of the different nutrients during the pre-bloom period. Examination of the data in Table I-B shows that some nutrients penetrate with varied degrees of concentration to a depth of three feet or more.

TABLE I-B

AVAILABLE PLANT NUTRIENTS AT DIFFERENT DEPTHS OF ARREDONDO AND LAKELAND SANDS

Samples Collected During Jan.-Feb. Pre-Bloom Period

Grove No.*	Soil Depth Inches	pH	Pounds Per Acre At Depths Indicated						
			Calcium	Magnesium	Nitrogen	Phos. Acid	Potash	Manganese	Copper
1	0-6	5.5	552	209	37	57	151	5	2
	6-12	5.2	144	92	36	35	87	3	tr
	12-24	5.4	240	124	19	67	96	8	tr
	24-36	5.4	240	144	21	79	77	10	tr
2	0-6	5.3	384	134	36	78	221	7	7
	6-12	5.3	204	58	32	47	115	4	tr
	12-24	5.2	168	56	37	96	125	8	tr
	24-36	5.2	168	86	4	108	72	6	tr
3	0-6	5.6	420	125	24	113	125	5	7
	6-12	5.0	36	22	10	91	24	4	2
	12-24	4.8	24	29	14	65	48	8	2
	24-36	4.7	12	21	9	36	34	3	2
4	0-6	5.5	372	113	61	139	94	5	10
	6-12	4.8	60	39	33	113	31	3	2
	12-24	4.6	tr	24	35	34	24	3	tr
	24-36	4.6	tr	16	23	31	19	3	tr

* The first two soils are Arredondo fine sands. The other two are Lakeland fine sands.

These data were secured using ammonium acetate (pH 4.8) as an extracting reagent, and accepted methods of analysis. Without properly calibrated records of crop response, these data have limited value.

The extent of root absorption at different soil depths is unknown, but it would be unscientific to disregard those nutrients below the six inch soil level, especially in the light of the data in Table II. Here it will be seen that only 50 to 60 percent of the root system is in the surface foot. It appears illogical and unscientific to disregard the roots and nutrients below the surface foot of soil in making interpretations.

Certain variations will no doubt exist regarding the data in these tables, but they are within the range of many records. Soil tests for samples taken in November usually contain less leachable nutrients than tests made for samples taken in February. Since citrus on the ridge soils (sands) have extensive root systems, it would be logical to conclude that soil samples for testing should be 12 or more inches in depth. The question of correct amounts of nutrients needed for different age trees cannot be overlooked. This is of prime importance in making interpretation.

It is a well established fact that a balanced nutrient program is more efficient than an unbalanced program. With differential leaching losses of nutrients, a heavy rainfall may and often does upset the nutrient balance in a short time. Without a knowledge of soil nutrients, it is not possible to know the degree of nutrient strains which often retards fertilizer efficiency.

One of the objectives in the establishment of the Short Research Grove in 1939 was to secure dependable and calibrated data for citrus on Lakeland sand. To the knowledge of the writer, this is the only grove in the state in which such efforts have been made over a period of years. Bulletin 3 published by Soil Science Foundation presents some of the findings in this grove. It is only natural to assume that calibrated data for Lakeland sand will not carry over to all soils. But they are very worthwhile and point the way for a scientific procedure of formulating fertilizer needs for this and possibly related soils.

Since the Duette Grove project on flatwoods soils is new and of short duration, it is too early to formulate dependable data for these soils. But the records to date indicate that calibrated data for Lakeland soils will not be satisfactory for flatwoods soils. Copper is a case in evidence. The differences in drainage, native humus and minerals appear to influence plant responses and nutrient absorption.

Soil Science Foundation is striving to secure correlated data from all sources and in particular its own groves. But the scope of the Foundation's activities is limited. Because of the trend toward intensified agriculture, the future will depend to a large degree on dependable methods of formulating fertilizer grades having a minimum of interferences, toxicities and waste, and a maximum of plant response. This cannot be done with a guessing program.

Modern soil testing is more than finding out which nutrients are critically low. The tests should include the kind and extent of nutrient strain and antagonism, and how they are related to crop response. Properly calibrated data offer the most promise. There seems to be no safe alternative. Experience has repeatedly shown that sporadic soil tests without systematic measurements of records, can only lead to confusion and waste.

Experts have estimated that 70 percent of all work performed by a large size tractor is "light load work.' Thus, a grower having an annual fuel bill of $1,000 could save $2,000 over a 10-year period if the drivers would "shift up" and reduce engine speed when doing light load work.

TABLE II

ROOT DISTRIBUTION OF CITRUS TREES IN LAKELAND SAND

Soil Depth Inches	Rootstock	(Each 12 inch layer gives the percent of total roots in the 48 inch depth for each designated distance from the trees 12 to 30 years old)					
		4 ft.	6 ft.	8 ft.	10 ft.	12 ft.	Average
0-12	Rough Lemon	68	52	52	35	40	58
12-24	Rough Lemon	17	22	29	39	12	24
24-36	Rough Lemon	11	15	11	22	39	20
36-48	Rough Lemon	4	11	8	4	9	7

The data were secured by removing columns of soil with a 4 inch tube. The soil columns were dried and the roots screened and weighed. The records represent an average (weight of roots) for ten different trees in five groves 12 to 30 years of age. The average weights, in grams, were 15.73, 14.38, 9.54, 5.23 and 3.54, for the 4, 6, 8, 10 and 12 foot distances, respectively, from the trees.

Fla. State Horticultural Society To Meet At Miami Beach...

The Executive Committee of the Florida State Horticultural Society wishes to announce that the 74th Annual Meeting of the Society will be held in Miami Beach at the Barcelona Hotel instead of the Diplomat Hotel in Hollywood Beach as previously announced. The dates remain the same however—Oct. 30-Nov. 2, 1961.

This change of meeting place was necessary due to conflicting meetings scheduled at the Diplomat Hotel in violation of our signed contract, which had assured us the exclusive use of the entire convention facilities of the hotel. We sincerely hope the change at this time will not inconvenience you.

Additional information, together with hotel reservation cards and pre-convention registration blanks, will be sent to all members in August.

PETERS RE-ELECTED PRESIDENT FLORIDA CITRUS EXCHANGE

Phil C. Peters of Winter Garden has been re-elected president and chairman of the board of the Florida Citrus Exchange during the 51st annual meeting of the large fresh fruit sales agency. Peters served his first term as a director of the Exchange in 1918, and has been president since 1956.

John T. Lesley, general manager of the Exchange since 1950, was also renamed to his position as executive head of the organization. He re-appointed all key departmental executives of the Exchange to serve during the 1961-62 season.

CONVENTION LADIES COMMITTEE APPOINTED

Mrs. Cola Streetman, Vero Beach, chairman of Ladies Activities Committee for the 18th Annual Convention of the Florida Fruit & Vegetable Association has announced committee appointments.

The convention will be held at the American Hotel, Bal Harbour, Miami Beach, on September 27, 28 and 29.

Roll-Board Method of Place-Packing Fresh Citrus Fruit Saves Time

About 20 per cent of a packer's time can be saved if a roll-board type of packing station is used instead of bins in place-packing fresh citrus fruit, according to a report issued today by the U. S. Department of Agriculture.

This estimate is based on laboratory tests of an experimental model of the roll-board, which is a sloping board on which the fruit rolls down to a stop-board which retains the fruit until it is picked up by the packer.

Roll-boards were later tried in two commercial packinghouses in Florida and were found to be satisfactory.

Marketing researchers reported that most of the packers who used the roll-board method of packing agreed that it was less fatiguing and permitted greater output per packer than when they had to pick up the fruit from various parts of a flat bin.

In place-packing, the packer places the fruit in the container in a specified pattern. One of the largest expenditures for labor in plants packing citrus fruit is the expenditure for packers' wages, the report shows. Holding down the cost of packing a box of fruit should make it possible to hold down prices to consumers.

The Citrus Experiment Station of the Florida Agricultural Experiment Station cooperated with USDA's Agricultural Marketing Service in this work. The study was part of a broad program of research aimed at improving marketing efficiency and expanding the market for farm products.

A free copy of the report, "An Improved Place-Packing Station for Citrus Fruit," AMS-447, may be obtained from the Marketing Information Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

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OBSERVATIONS ON STUBBORN AND OTHER DISEASES OF CITRUS IN MOROCCO IN 1959

(Continued from Page 7)

(**C. limon**) variety unknown but Eureka type; and pummelo (**C. grandis**) variety unknown.

Incidence of Stubborn Disease in Commercial Orchards

Stubborn trees were found in all the citrus areas visited in Morocco. The number of affected trees varied from negligible in some orchards to quite high in others. The short time available permitted few tree-by-tree counts in each area, but the following notes, divested of marginal cases, serves to indicate the situation: In the Mechra Bel Ksiri region, 10% of approximately 7000 Washington Navel trees had symptoms of stubborn; 30% of 12-year-old Valencia orange trees were moderately affected with stubborn; and a few % of 20-year-old Washington Navel trees were affected with stubborn.

In the Sidi Slimane region, 10 to 15% of an orchard of 30-year-old Clementine trees was showing symptoms of stubborn; also 10% of the trees in a Thomson Navel orchard; 80% of the trees in an orchard of Washington Navel, and an estimated 10% of the trees in a Washington (grosse) Sanguine orange orchard were stubborn.

In the Meknes region 38% of the trees of an unknown variety of sweet orange, and most of the trees in a 23-year-old planting of Clementine, had mild stubborn symptoms; many citrus trees on the experiment station grounds at Ain Taoujdat had stubborn symptoms.

In the Beni Mellal region mild stubborn symptoms were present in almost every tree of a 6-year-old planting of Washington Navel oranges; the same condition existed in a 5-year-old planting of Valencia orange trees; and 10% of the trees in a 10-year-old planting of Washington Navel orange showed severe symptoms of stubborn; many trees in a 10-year-old planting of Hamlin oranges were stubborn from the age of 4 years; and many trees in 17-year-old Valencia plantings exhibited severe stubborn symptoms.

In the Marrakech region, Menara and Souelah Experiment Stations, many trees with stylar-end greening were present in the citrus variety collections.

In the Sous Valley, Taroudant region, 36% of the trees in a 17-year-old Valencia orange planting showed stubborn symptoms; 29% of the trees in a mixed planting of 6- and 12-year-old Valencia orange trees, and 5% of trees in a 17-year-old orchard of Washington Navel orange showed pronounced stubborn symptoms.

Productiveness of Stubborn Trees

Stubborn trees characteristically bear appreciable numbers of fruits as small as 553 fruits per 90-pound box. As the condition of the tree becomes worse and the total number of fruits decreases, the relative number of small fruits increases.

Some information on the effect of stubborn on the production and size of fruit was obtained at the Bonamour farm near Sidi Slimane, as a result of an experiment started there in 1952 by Paul Rieuf, pathologist. In a 10-acre block of Washington Navel trees then 4 years old, three trees showing unmistakable symptoms of stubborn were selected for an experiment. One tree, designated as "A," received the same cultural treatment as the remainder of the block. The other two trees, designated as "B" and "C," were given a "rich additional application" of fertilizer, but the amount was not recorded. After the experiment had been in progress 7 years (Nov. 1959) and after there had been one light picking of fruit, the owner estimated the remaining crop as follows: Tree A — 10 to 15 kilo, Tree B — 70 kilo, and Tree C — 100 kilo. Because Trees B and C were in fairly good condition the owner considered the treatment successful.

At the authors' request, Trees A, B, and C were picked to determine what percentage of the crop was unmarketable because of small size and misshapen condition. For comparison, the crop was harvested from a nearby healthy-appearing tree of the same variety and same age, tree D (two trees distant from tree C). The crop from each tree was sorted by the authors into two categories, normal fruit and stubborn fruit (very small size and/or misshapen). Fruit production on the diseased trees was obviously much less than that of the "healthy" tree D. The yield of **marketable fruit** (normal) from the moderately affected trees (B and C) was approximately 50% of the yield estimated. For example, tree B had 31 kilos of marketable fruit out of 59 picked, and tree C had only 54 kilos marketable out of 100. Obviously tree D produced more total fruit and several times more marketable fruit than trees A, B, and C. One should not overlook the fact that the trees receiving extra fertilizer (B and C) produced more heavily than the one that did not (tree A produced only 21.5 kilos), but whether the increased production was worth the cost is a question that remains unanswered. Judging by its production of stubborn fruit, tree D is also infected, although mildly.

The effect of stubborn disease on fruit production was observed in another orchard of Washington Navel trees that had shown stubborn symptoms from the outset. At 10 years of age (date of the last picking) they produced approximately 200 boxes per acre. A nearby planting of Hamlin orange trees that showed stubborn symptoms from the fourth year, at 10 years of age produced approximately 350 boxes per acre. The Hamlin trees were twice the size of the Washington Navel trees. Why the Hamlins yielded so much better than Washington Navels is unknown, but it should be noted that the Washington Navels seem to react more severely to stubborn infection than other varieties of sweet orange.

An opinion shared by some observers in Morocco and elsewhere (13, 18) holds that much of what is called stubborn disease is in reality poor growth resulting from bad soil structure, poor drainage, and related causes. However, stubborn trees were not limited to any one area, or soil type, or part of an orchard, but were scattered at random. Alluvial soils or even wind-laid soils are not so variable in structure as to account for a poor tree between two healthy ones or vice versa. The soil structure was examined at two locations; in one case, holes approximately 40 inches deep were dug beside a healthy tree and beside a stubborn tree 5 or 6 yards distant. No difference in soil structure was apparent to that depth. At another location the soil structure was observed to a depth of about 5 feet. No hard pan or impervious layers were observed. In both locations the top 9 or 10 inches of soil was darkened by organic matter and graded off into a light brown, loamy clay.

Other Causes of Poor Citrus Trees

Stubborn disease was not responsible for all the unhealthy trees observed in Morocco. Other causes were as follows:

Fungus Diseases: Foot-rot, caused by **Phytophthora** spp., appeared to be the most important fungus disease of citrus trees in Morocco. It caused considerable damage to lemon trees in several locations, and resulted in some damage to range trees. Greasy spot, caused by **Mycosphaerella horii** Hara, was seen on citrus leaves at several locations but was not serious anywhere. Concentric canker caused by **Fomes applanatus** (Pers.)

Wallr. (5), a wound parasite and wood-rotting agent, was seen occasionally on older trees but was not commons.

Virus Diseases: Next to stubborn disease, the most commonly seen virus disorder of citrus trees in Morocco was the scaly bark form of psorosis. In several orchards it was causing considerable damage. A count of trees with psorosis-A in an orchard of 1100 Valencia trees, 17 years of age, showed approximately 21% infected. Other forms of psorosis, such as concave gum and blind pocket, were much less common.

Xyloporosis (cachexia) symptoms were seen occasionally in the bark of Clementine trees. At present it seems to be causing little trouble in Morocco but would constitute a hazard if susceptible rootstocks such as Rangpur lime or sweet lime were used.

Evidence of exocortis virus was seen only on Rangpur lime in experimental plantings at Ain Taoujdat. At present exocortis is causing no trouble in Morocco but it would prevent the use of **Poncirus trifoliata** and hybrids of **P. trifoliata** as rootstocks. Exocortis virus appears to be widely distributed in commercial citrus trees.

Tristeza was found in Meyer lemon in Morocco by H. Chapot and J. Cassin at the time of our visit, but in commercial orchards we saw no evidence of its presence or that it was causing any losses. However, tristeza could be responsible for some of the stunting of sweet orange trees on sour orange rootstock that was seen, and such trees should be indexed on West Indian lime to investigate that possibility. Prof. G. Ruggieri pointed out evidence of Impietratura delle Arance (19), a rind spot that he had experimentally transmitted through budwood. It was seen at several locations, but nowhere was it commercially important. At Ain Taoujdat, bark scaling was noted on Rhobz el Arsa (**C. medica** x **C. aurantium**, according to Chapot) rootstock with Clementine mandarin top but the cause is not known.

Deficiency Diseases: Zinc-deficiency symptoms (frenching) were observed on citrus trees in most districts and severe chlorosis was observed in several orchards of the Sous Valley. Heavy applications of nitrogenous fertilizers that caused a greater need for zinc doubtless accentuated the problem. Indications of magnesium and manganese deficiencies were seen occasionally, but usually in conjunction with strong zinc deficiency, which obscured the symptoms and made the diagnosis uncertain. Iron deficiency (lime-induced chlorosis) was rather common, but less so than zinc deficiency.

Diseases of Unknown Cause: Gummosis (Florida gummosis, or Rio Grande gummosis) was observed frequently on lemon trees and occasionally on sweet orange trees but was not causing serious damage.

Conclusions

Stubborn disease appears to be the most serious disorder of citrus trees in Morocco. Symptoms were observed in all the citrus regions visited and in certain orchards a majority of the trees exhibited symptoms. The manner in which stubborn spreads from tree to tree is not known, and the few experimental transmissions leave many questions unanswered. The occasional appearance of stubborn symptoms on previously healthy trees, 15 years of age and older, suggests that such trees became infected after they were planted and raises the question of whether the disease can be transmitted by insects.

The authors saw no evidence that stubborn symptoms result from poor soil structure, bad drainage, or other soil conditions (13). However, stubborn symptoms often appear to be accentuated by factors that depress tree vigor, such as damage to roots by various causes and inadequate or unbalanced fertilization. Conversely, factors favorable to tree vigor, such as heavy fertilization and small crop, appear to make stubborn symptoms less pronounced.

Other disorders occasionally caused damage to citrus trees in Morocco. Psorosis was generally present and was causing appreciable damage in several orchards. Foot-rot (**Phytophthora** spp.) was generally present also and causing considerable damage in a few orchards.

Minor-element deficiencies, principally zinc and iron, were serious in certain districts.

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(Continued on Page 15)

[a] A similar disease of citrus trees in Palestine has been attributed to **Ganoderma lucidum** by Reichert and Avizohar (16).

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CITRUS ROOTSTOCKS

Rootstocks exert a vital influence on the production and management problems of citrus groves, and their importance should not be overlooked when planting or buying a grove. The wrong rootstock for a given soil type or for a particular variety can mean the difference between success and failure in a grove operation.

The fact that some rootstocks perform better on certain soils than others has been common knowledge for many years. During the infancy of the Florida citrus industry, the selection of rootstocks was relatively simple. Generally, sour orange rootstocks were used on low, wet soils; rough lemon on high, sandy soils; and trifoliate orange or sour orange stocks in the colder areas. Recognition of tristeza, xyloporsis, exocortis and possibly other virus diseases has complicated the rootstock problem. In addition to the virus problem, demands for higher solids in fruit is growing — which emphasizes a need for better rootstock as well as scion varieties.

Problems connected with rootstocks are little understood, but the influence of stocks on scions and vice versa is often more important than the influence of environmental factors. Rootstocks influence vigor, cold hardiness, fruitfulness, fruit quality, and disease tolerance or resistance.

ROUGH LEMON

Rough lemon is the most widely used rootstock in the state today, particularly for plantings on the light, sandy, well-drained soils of the Ridge section. It is a vigorous grower — producing large trees faster than most other rootstocks— and bears heavy crops. This rootstock is not recommended for low, heavy, poorly-drained soils, because of its susceptibility to foot rot.

This rootstock is highly tolerant of tristeza and xyloporosis, but it is susceptible to root and crown rot disease. Like all other known rootstocks, it is subject to attack by various nematodes that plague citrus.

Although scion varieties produce well on this stock, the fruit is of poorer internal quality than that produced by sour orange, sweet orange, Cleopatra, or trifoliate orange. Rough lemon cannot be recommended for colder areas, for it is one of the tenderest of our commercial rootstocks.

When choosing between rough lemon, sweet orange, and Cleopatra rootstocks for light, sandy, well-drained soils, one must weigh the advantages of increased yields by rough lemon against the improved quality and smaller crops of the other two.

. . . BY . . .

JACK T. McCOWN
ASSISTANT CITRICULTURIST
AGRI. EXTENSION SERVICE
UNIVERSITY OF FLORIDA
GAINESVILLE, FLORIDA

SOUR ORANGE

This rootstock has been used extensively for citrus wherever soils are low, wet, or heavy — as for instance in the Indian River section.

It is highly resistant to foot rot and tolerant to xyloporosis, but is highly susceptible to tristeza. Because of its resistance to foot rot, it is better adapted to heavier soils where drainage conditions may be less satisfactory. However, it is a slow grower on light, sandy soils.

Of the commonly used rootstocks, sour orange is second only to the trifoliate orange in cold hardiness.

Although it produces fruit of outstanding quality, its use for commercial plantings in the future seems unwise in view of the tristeza problem. Although tristeza has not proved to be as disastrous in Florida as was first anticipated from results in South America, the possibility of getting more virulent strains of the virus or more efficient insect vectors makes this disease a serious potential threat to existing groves on sour orange rootstock. Moreover, trees propagated on sour orange with budwood carrying the virus will be stunted and unthrifty. Anyone who determines to use sour orange in future plantings should do so as a calculated risk.

CLEOPATRA

Many people feel that the Cleopatra tangerine is most likely to replace sour orange as a commercial rootstock. While there is some indication that Cleopatra can fill some of the needs left vacant by the elimination of sour orange, it is by no means equal to sour orange under all conditions. It is adaptable to a wide range of soils, the trees grow well in the deep sands of the interior of the state, as well as in the low, moist soils of the Coastal area. However, in the very light sands, the fruit crops of most scion varieties on this stock have been disappointing in amount and size of fruit. The trees bloom normally but often fail to hold their crop. This shortcoming does not apply to the better types of the Lakeland fine sands.

Cleopatra is tolerant to xyloporosis and tristeza, and possesses considerable resistance to foot rot.

This rootstock produces fruit of excellent quality and is a preferred stock for Mandarin type scion varieties, especially Temple and tangelos. It apparently comes into production more slowly than rough lemon and with Hamlin scions produces fruit of small size. Valencia and grapefruit trees on Cleopatra mandarin usually produce one or more boxes less fruit per tree than would similar trees on rough lemon stock.

The cold hardiness of Cleopatra is more than rough lemon but less than sour orange and therefore, it is less suitable in northern producing areas than sour or trifoliate orange for some varieties.

SWEET ORANGE

Sweet orange is rapidly gaining in popularity and use as a rootstock throughout the state. It appears to be adaptable to light, sandy soils

and the well-drained heavier soils. Scion production on this stock appears to be second to rough lemon for most orange and grapefruit varieties. Valencias are apparently much more productive on rough lemon rootstocks. (Although very susceptible to the foot rot organisms, it is tolerent to tristeza and xyloporosis.) Sweet orange falls between rough lemon and sour orange in cold hardiness.

This rootstock produces fruit of excellent quality, on both light, sandy soils and well-drained, heavier soils. Fruit size on sweet orange rootstock is generally good, approximately that on rough lemon.

TRIFOLIATE ORANGE

The exceptional cold hardiness of most varieties budded on trifoliate orange makes it a desirable rootstock for home plantings in the northern and northwestern areas of the state. The dwarfing effect, a symptom of the virus exocortis, is undesirable commercially but can be used to an advantage when citrus is used in landscaping small properties.

When used as a rootstock, the trifoliate orange produces excellent quality fruit and good production per volume of tree.

When exocortis-free budwood is generally available, this rootstock may take an important place among rootstocks used in producing citrus.

GRAPEFRUIT

Many years ago hundreds of acres of citrus on grapefruit rootstock were planted in the state. For a while, it was thought to be an excellent stock, since it produced vigorous trees. It soon became evident that although scion varieties produced fruit of acceptable quality when budded on this rootstock, the trees did not fruit heavily and showed a definite tendency to alternate bearing.

This rootstock is somewhat susceptible to tristeza and foot rot. Since it has no major advantages to offset its many disadvantages, grapefruit is not recommended for planting.

RUSK CITRANGE

The tolerance of rusk citrange to the virus diseases exocortis, xyloporosis, and tristeza and also resistance to foot rot has not been fully established. Trees on this stock are very productive for their size and bear fruit of excellent quality.

OTHER ROOTSTOCKS

There are other citrus varieties being tested by Experiment Station workers as possible rootstocks. To date, insufficient data are available upon which to base recommendations. To be worthy of consideration, new rootstocks must have such characteristics as vigor, adaptability to wide range of soil conditions, production of high yields of good quality, cold hardiness, tolerance or resistance to virus diseases, and resistance to various root diseases and nematode attacks. Research in this phase of citriculture is a long-term process, and many years will be needed to answer many of the current questions on rootstock relationship to scion varieties and environment.

OBSERVATIONS ON STUBBORN AND OTHER DISEASES OF CITRUS IN MOROCCO IN 1959

(Continued from Page 13)

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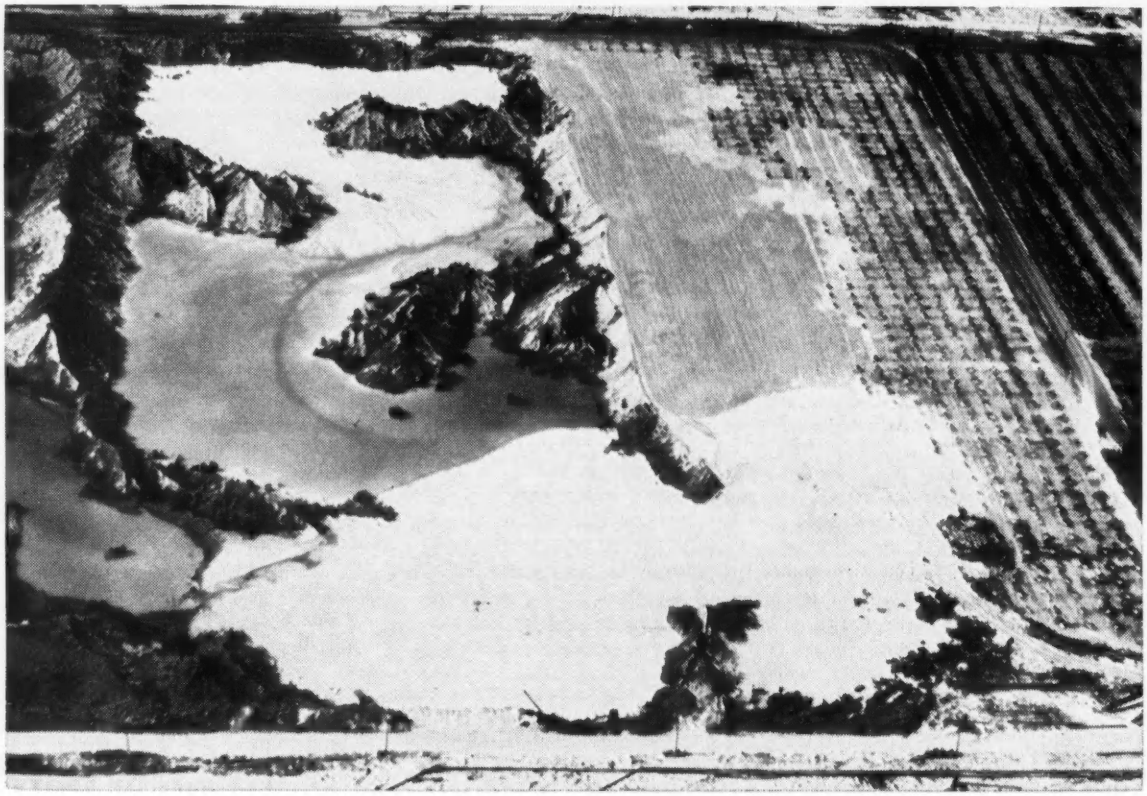

One view of new citrus planting on reclaimed phosphate mined over land.

Bartow — Reclaimed phosphate land is proving valuable for planting to citrus, some 200 civic and conservation leaders were told recently during a tour of Virginia-Carolina Chemical Corp. mining areas.

Future homesites and recreation areas also were inspected during a bus tour of the Bartow and Homeland section.

One of the most spectacular examples of reclamation displayed to V-C's guests was an island along the west bank of Peace river, near the Clear Springs mine, southeast of Bartow.

The island was created from what was once a tangled cypress swamp by digging a canal on one side and putting fill dirt on top of the swamp muck.

Dragline Moved

V-C officials explained that this fill was put in three years ago when a dragline was moved across the river to a mining area. The dragline's path, they said, represents about five acres of reclaimed land.

Land Mgr. William J. Menear reported that V-C began experimental citrus plantings two years ago on a leveled-off overburden dam south of U. S. Highway 17 near the Clear Springs mine.

The trees are thriving and more plantings are being undertaken.

Andrew A. Farrell, V-C's vice-president for mining, said that about 200 acres of citrus already have been planted.

"It is our intention to plant about 80 to 100 acres more each year," he said. "In the next four or five years, we hope to be operating 600 acres."

Level and Fill

Both leveling of overburden mounds and pumping in of sand tailings are used to reclaim mined-out areas. Lakes are left where this work has been completed.

Menear pointed out that, where citrus plantings are involved, the lakes serve both for irrigation and to stablize temperatures for protection from frost.

The 3300-acre Clear Springs mining area includes about 900 acres of river swamp which now is unusable, the touring group was told.

V-C has "immediate" plans for developing between 200 and 300 acres of this swamp into usable land. Long-range plans call for developing at least another 200 acres of high ground on tailings sand around the edges of mined-out areas.

Among those who participated in the tour of land reclamation and utilization projects undertaken by Virginia-Carolina Chemical Corporation were:

Arthur Bissett, Executive Director, Polk County Property Owners League.

Julian Durrance and Floyd Woods, Polk County Commissioners.

Paul Hayman, County Agricultural Agent.

Scott Kelly, State Senator.

J. Harden Peterson, Jr., Lakeland civic leader.

J. Herman Reitz, Director, Citrus Experiment Station, Lake Alfred.

John Wakefield, Director, Florida State Water Resources Board.

J. F. Alexander and Frank Murphy, Bartow Chamber of Commerce.

Florida Citrus Growers And Shippers Committees Named

Appointment of eight members and their alternates to the Florida Growers Administrative Committee and to the Shippers Advisory Committee has been announced by the U. S. Department of Agriculture.

These committees serve under the marketing agreement and order program regulating the handling of Florida oranges, grapefruit, tangerines, and tangelos. Period covered by these appointments is Aug. 1, 1961-July 31, 1962.

Members and their alternates named to the Growers Administrative Committee are:

W. R. McMullen and Hugh S. Dawson, both of Tampa; E. L. Atkinson, Umatilla, and Guilford T. Sims, Tavares; Lail Morthland, Wiersdale, and T. C. Holden, Ocala; Jack H. Ross, Oakland, and O. N. Lee, Jr., St. Cloud; Philip C. Gates, Fort Pierce, and Alexander W. Ryburn, Vero Beach; Charles G. Metcalfe, Avon Park, and Cole Danley, Jr., Lake Placid; William L. Raley and L. B. Anderson, Jr., both of Winter Haven; George W. Barr, Winter Haven, and Erle L. Wirt, Jr., Babson Park.

Members and their alternates named to the Shippers Advisory Committee are:

A. T. Brandon, Winter Haven, and S. Carey Colley, Tavares; Donald M. Lins and H. G. Gumprecht, Jr., both of Tampa; Anthony M. Scotto, Fort Pierce, and C. M. Seraphine, Vero Beach; E. K. James, Lakeland, and S. C. Battaglia, Winter Park; Jas. A. Henderson, Frostproof, and Ralph Wetherington, Winter Haven; John R. Schirard, Jr., and Ernest M. Southward, both of Sanford; Robert E. Snively, Lake Hamilton, and Jules W. Bragin, Clearwater; Thomas E. Gamble and Francis X. Heidrich, both of Orlando.

The Shippers Advisory Committee makes recommendations to the Growers Administrative Committee, when it is deemed advisable, to limit the shipment of certain grades and sizes of oranges, grapefruit, tangerines, and tangelos.

The Growers Administrative Committee considers these recommendations and then submits its own recommendation, together with those of the Shippers Advisory committee, to the Secretary of Agriculture. The Growers Administrative Committee also serves as the Official administrative body under the amended marketing agreement and order program.

EARLY NEMATODE WORKER RETIRES

Insects in Florida lost a formidable foe when Homer E. Bratley, an assistant entomologist with the Florida Agricultural Experiment Stations, retired June 30. For more than 36 years, Bratley has waged war on nematodes and troublesome insects.

During his early years with the Experiment Stations, he worked closely with Prof. J. R. Watson, one of the earliest nematode authorities in Florida. Almost from their inception in Lake City in 1888, the Florida Ag. Experiment Stations have been vitally concerned with nematodes.

Watson and Bratley did much to shed more light on the rot-knot nematode—in those days there were no nematologists so it was up to entomologists to carry on the work. Watson and Bratley experimented with mulches and the use of alternating immune or resistant plants with susceptible plants to cut down the nematode population. Much of their work forms the foundation of today's knowledge of nematodes.

WILLIS RE-ELECTED HEAD OF LOAN AND GUARANTY COMPANY

H. H. Willis, Sr., of Fort Pierce has been re-elected to the presidency of the Growers Loan and Guaranty Company, a production lending facility affiliated with the Florida Citrus Exchange.

Also re-elected to serve with Willis is James Samson of Tampa, executive vice president; and Counts Johnson, secretary. Willis has been president of the Growers Loan and Guaranty Company since last February when he was elected to serve out the term of John E. Olson, deceased.

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Temperatures In A Small Polyethylene Covered Greenhouse

BY WARREN B. JOHNSON

The use of polyethylene as a covering of greenhouses has been on the increase in Florida. To determine the effect of a plastic house on the temperatures, a 6 ft. wide, 8 ft. long and 6 ft. high frame was constructed and covered with 2 mil clear polyethylene. This house was set on the writer's lawn in Lakeland, two miles SSW of the City Hall, so that readings could readily be taken seven days a week. It was placed well out in the open so it was well exposed to incoming and out-going radiation and general circulation.

Instrumentation: A regular fruit-frost station equipped with minimum recording thermometer and hygrothermograph was maintained about 30 feet from the plastic house. Similar instrumentation in a fruit-frost shelter without legs was maintained in the plastic house two feet from the north and east walls. A shelter equipped only with a minimum recording thermometer was set right outside. A minimum recording thermometer was exposed in a small shelter about three feet above the ground in the plastic house. Maximum and minimum recording dial type soil thermometers were installed with the sensing elements in the ground at the 4-inch depth inside and outside of the plastic house. Readings were taken regularly from January 1 until March 8, when a rather strong wind during the afternoon of March 8 sailed the supposedly well-anchored plastic house across the lawn. This finished the records for the season.

26 Percent Of Produce Is Shipped Direct To Retailers

Twenty-six percent of all receipts of fresh fruits and vegetables in 23 principal markets is delivered directly from producing areas to central warehouses of large-scale food retailers, the U. S. Department of Agriculture has reported.

The report was made by USDA's Agricultural Marketing Service on the basis of data from 23 leading terminal market areas where it maintains offices of the Fruit and Vegetable Market News Service. Part of the work of the Market News Service is the regular collection and release of statistics on receipts of fruits and vegetables — the important "supply" element in marketing.

The tabulation used as its base the total reported receipts of fresh fruits and vegetables by rail and truck. It then determined what part of these receipts was delivered directly from the producing areas to central warehouses operated by large food retailer groups or organizations, and did not pass through the wholesale markets in these cities. Total receipts in these markets also include deliveries to prepackagers, potato chip makers, processors, and military installations.

September 1960 and March 1961 were chosen for the tabulation as typical months. September was selected to represent a month in which considerable supplies would be available from production in nearby areas; March was selected as a month in which these markets would be largely supplied by fruits and vegetables shipped in from more distant areas.

Data for the 23 markets have been combined into three regional groups — Eastern, Central, and Western cities. The eight eastern market areas are New York-Newark, Boston, Philadelphia, Pittsburgh, Baltimore, Washington, Atlanta, and Birmingham. The 10 central market areas are Cleveland, Cincinnati, Detroit, Chicago, Louisville, St. Louis, Kansas City, Minneapolis-St. Paul, Dallas, and New Orleans.

Processing Conference In Winter Haven

Latest developments in citrus utilization research by the U. S. Department of Agriculture will be reviewed for industry and other research agencies at the Eleventh Annual Citrus Processing Conference in Winter Haven, Fla., on Sept. 20.

Announcement of the conference was made by Dr. C. H. Fisher, Director of the Southern Utilization Research and Development Division, which sponsors the conference through the U. S. Fruit and Vegetable Products Laboratory at Winter Haven, one of the Division field stations.

Other departmental laboratories also conducting utilization research on citrus will participate with the Winter Haven, Fla., laboratory in the conference. These are the U. S. Fruit and Vegetable Products Laboratory of Weslaco, Texas; the Fruit and Vegetable Chemistry Laboratory of Pasadena, Calif., and the Western Regional Research Laboratory of Albany, Calif. The latter two laboratories are laboratories of the Western Utilization Research and Development Division.

The conference is open to members of the citrus industry and related industries, to research workers, and others interested in citrus processing. Complete details regarding attendance at the event may be obtained from Dr. M. K. Veldhuis, U. S. Fruit and Vegetable Products Laboratory, 600 Avenue S, N. W., Winter Haven, Fla.

SOUTHERN DOLOMITE
PALMETTO, FLORIDA
PHONE: BRADENTON 2-1411

Lemon Growers Reject Marketing Amendment Order

Growers have rejected a proposed amendment of the Federal marketing agreement and order regulating handling of California-Arizona lemons, the U. S. Dept. of Agriculture has announced.

Three provisions of the amendment to the order were submitted jointly by Sunkist Growers, Inc., Pure Gold, Inc., and the Western Fruit Growers Sales Co.

These provisions would have (1) authorized marketing research and development projects to assist, improve, or promote marketing, distribution, and consumption of lemons; (2) revised the definition of the term "lemons available for current shipment"; and (3) increased the weekly overshipment tolerance.

In addition, Pure Gold, Inc., proposed to require a minimum of eight concurring votes for the administrative committee to recommend increasing the weekly volume of shipments whenever the recommendation is not made at an assembled meeting of the committee. Seven votes are now required.

Sixty-eight per cent of the growers opposed the proposed amendment, and these growers represented 73 per cent of total production.

The Agricultural Marketing Agreement Act of 1937, under which the lemon program is effective, requires that at least three-fourths of the growers—or two-thirds of the volume of production—must favor amendments before they can be put into effect by USDA.

11,000 STATE VISITORS SEE MINUTE MAID PLANTS

More than 11,000 visitors from all 50 states and some 30 foreign countries toured Minute Maid Company's three processing plants during the tour season just ended.

The final count was 11,042 people as compared with 11,630 during the 1960 tour season, a decrease of approximately five percent attributed to the general business inactivity which kept many people closer to home this year.

REWARDS PAID FOR INFORMATION DEALING WITH CITRUS CROP THEFTS

A total of $3,400 in rewards has been paid by Florida Citrus Mutual to persons giving information leading to the arrest of citrus thieves since last September, Robert W. Rutledge, Mutual executive vice president, said recently.

Mutual pays a $200 reward to anyone giving information leading to the arrest and conviction of persons caught stealing fruit from a member's grove. During the 1960-61 season Mutual paid 17 citrus theft rewards.

Rutledge said a total of 123 cases involving citrus fruit thefts have been solved by sheriff departments throughout the citrus belt since January. He said that this is a "good example" of the work the citrus belt sheriffs and the Florida Sheriffs Association are doing in curtailing citrus thefts throughout Florida.

A scientist has figured that if you drink 2 glasses of milk a day for 200 years, the strontium 90 it contains at present levels would produce less radioactivity than that in a single chest X-ray.

TOUR OF GROVES HELD BY CITRUS GROWERS

Citrus growers participated in herbicide demonstration tour last week according to Jackson A. Haddocx, assistant county agent for the Agricultural Extension service.

The tour was sponsored by the Florida Agricultural Extension Service, the Citrus Experiment Station, and cooperating growers.

Those participating in the tour met at 10:30 a.m. at the Joel Garrard grove at Sand Lake.

The results of Dalapon spraying of Bermuda, Pangola and Johnson grass in the C. W. Albert grove and preemergence weed killers sprayed on the ground around year-old trees in the Garrard grove was studied.

There are still unlimited opportunities in the Florida citrus industry. The industry didn't just happen. It has been planned, and planned well, from the very beginning. It took foresight and courage on the part of grove owners to overcome the elements, insects, diseases and a thousand and one other handicaps which over the years have been wiped out slowly but surely.

Superior Sally says:
"Groves which had high rust mite population when sprayed in June or early July should be watched closely for rust mite buildup."
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Reports Of Our Field Men . . .

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

R. C. Revels, Jr.
P. O. Box 3332, Apollo Beach, Fla.

Due to the dry weather experienced in this area during May, June and part of July, most of the citrus growers had to wait for the summer oil spray and a lot of rust mite damage has shown up in the groves. Some growers used sulphur dust to knock them down until enough moisture for the summer oil. A lot of areas still do not have enough rain to do too much good. Young growth that had started to grow before the dry spell has just started growing again in the areas fortunate enough to get some showers. A very close watch should be kept for reinfestation of mites during the coming weeks.

Tomato growers have started to treat and bed their land for the fall crop which at this time seems to be some smaller than last year. Most fields will be along the coast line, to take advantage of the warm air this fall.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glendale 3-4537
Avon Park, Fla.

We are still getting rains but it appears to follow the same pattern leaving some areas with only just enough to get by without irrigation. Where rains have been plentiful we have had good growth and trees are looking good. In some cases there has been a very heavy late bloom but is found mostly on trees where the early bloom was light.

By this time the summer fertilizer application is completed and the summer oil spray is on. Attention now is being given to the feeding of the young trees. One or possibly two more feedings on them will be made before turned loose for the winter.

The new fruit crops are looking good but there has been a lot of damage from rust mites. There was a tremendous build-up just about early oiling time and with the heat and dry weather damage was done before controls were applied. Orange size looks fairly well at this time with Valencias still holding the lead as to size of normal crop.

Vegetable growers are preparing land for the fall crop but a little early to know just what size plantings we will have.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We have been blessed with real hot weather, and some very nice rains. Groves are looking good, and lots of growth and bloom. Fruit still looks to be a small crop for next season unless this July bloom sticks. Cover crops coming fine, and it is a good idea to clean ditches and low land now before the rain season gets here.

Pastures are good looking now, green and cattle doing fine.

HILLSBOROUGH, PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

Several areas of this section of the state are suffering from lack of water. Most all of this section could use rains. Seems that the rains have been fairly stationary over several small areas with no movement to them. They seem to make up and rain out in these particular areas.

I have noticed in a number of groves that have applied their oil sprays using the light oil that the purple mites and Texas citrus mites are still with the growers. The oil sprays should have cleaned the trees of the mites, but for some reason it did not. I think it would be a good idea if you growers have the trees checked for this and if you have to do so, use a supplement and rid the trees of these mites.

In most areas where the bloom was light in the spring, bloomed fairly heavy in June; however, due to the dry weather it seems that most of this bloom fell. Even so, we seem to have a good to heavy set of fruit over all this area.

HIGHLANDS AND POLK COUNTIES

Jack Rubush and Gene Swearingen
P. O. Box 1304
Winter Haven, Fla.

The summer rains are still not very generalized over the southern part of the county. In some areas the trees are looking very good, yet in other areas the trees are showing temporary wilt.

Young trees are showing very good response to the last fertilizer application and rains. However, some of the older trees have not flushed out yet as we would like to see them. This is probably due to the dry season which we have experienced.

Our big insect problems at the present are: rust mite, red scale, black scale, and mealybugs. The summer spray should be timed for rust mite if the scale populations are light. If the scale populations are heavy with high populations of rust mite on the fruit, oil and chlorobenzilate would give best control. All efforts should be made to have the summer spray applied before August first.

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Chances are that they ain't too many of us folks in this business who kin solve all the world's problems, so maybe it would be jist as well if we stuck to our own business, fer we have demonstrated over a long period of years that in spite of weather, pests, market problems 'n such, us Florida growers are sufficiently familiar with the problems that affect our own business to produce fruit and vegetables that millions of our own folks and heaps of others outside the continental United States find mighty good eatin'.

We used to worry a bit about over production, but in addition to the millions of boxes of fine fresh fruit we ship to market every year, they is scarcely a year goes by that we don't develop some popular line like frozen concentrate, and jist recently fruit crystals and some others that is in the makin' which provides a satisfyin' market fer our citrus . . . to say nothin' of cattle feed, molasses 'n other products that serve a valuable purpose in other industries.

So, as we have said so many times before if they is any better and generally more profitable legitimate business than growing Florida citrus products we don't know what it is.

And, like we have also said many, many times before the best way to Produce Maximum Crops of Finest Quality is to provide your trees and crops with Lyons Fertilizers.

FLORIDA PROCESSORS SAID TO HAVE PACKED 84 MILLION GALLONS

Florida citrus processors packed almost 84 million gallons of frozen orange concentrate for the 1960-61 season. Robert W. Rutledge, Florida Citrus Mutual executive vice president, said in a wind-up report on frozen orange concentrate.

Rutledge said the total estimated concentrate pack for the season is 83,800,000 gallons compared to slightly over 78 million gallons packed last season.

"This season's final pack of frozen orange concentrate reflects a sharp increase in orange usage of about 7½ percent over last season in addition to the largest pack in the industry's history," Rutledge said.

He said even with the smaller orange crop this year, approximately four million more boxes of oranges have been used this season in making concentrate in comparison with last year.

Latest available figures show that concentrators have utilized about 55,600,000 boxes of oranges in making their product.

"Consumer sales of concentrate continue at a completely satisfactory rate," Rutledge said. "For the week ending June 17, retail sizes purchased by consumers in the U. S. totaled 1,279,000 gallons which is two percent more than in the comparable week last season."

Rutledge said for the week ending June 17, consumers spent $5,512,000 for concentrate as against $4,790,000 on the same week last year.

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GRAPEFRUIT PROMOTION FUND ASSESSMENT EFFORTS DELAYED

A proposed campaign to raise new funds to promote grapefruit utilization through grower assessments cannot go into effect before the 1961-62 shipping season is under way, it has been learned.

Robert Evans, director of administration for the Florida Citrus Commission, said it would be "impossible" to have the names of all of Florida's citrus growers prior to Sept. 1.

Since acquiring the names of all the state's growers is a necessary step in implementing the citrus industry's new stabilization act, it appears virtually certain that any provisions of the act will not apply to grapefruit expected to be ready for shipment by early September.

RECORD ORANGE CROP OF 102 MILLION BOXES IS PREDICTED

A veteran citrus fruit buyer predicted here today that a prolific late bloom on citrus trees will swell next season's orange crop to a record-smashing 102 million boxes.

Frasure Hull, who buys fruit for 33 different companies, said he anticipated a 98-million-box crop of regular bloom oranges and an additional four million boxes of late bloom fruit.

Hull said the late bloom, which has been showing up on threes throughout the citrus belt during the past six weeks, is reported to be heaviest on trees between six and 10 years of age. There are about six million orange trees in this age bracket, he added.

The fruit buyer contended the heavy late bloom has not affected early price offerings for next year's crop.

Hull said the movement of frozen orange concentrate improved at about the same time that the late bloom became widespread and that advance offers for oranges remain about 40 cents per pound of solids.

SCIENTISTS CAN MODIFY WEATHER TO AID GROWERS

The old saying that nobody does anything about the weather is not quite true anymore, according to a University of Florida agronomist.

Dr. V. N. Schroder, with the Agricultural Experiment Stations, says researchers are trying by physical, chemical and biological means to do something about the effect of light on plant growth.

He adds that without light there is no vegetation and that without vegetation this would be an entirely different world. Manufacture of food by plants, a process known as photosynthesis, is dependent on light as a source of energy.

Mrs. F. A. Bonifay, Cantonment, was elected president of the Florida State Home Demonstration Council at the group's 37th annual meeting at the University of Florida.

Other officers are Mrs. A. J. Sheely, Lake City, first vice president; Mrs. O. F. Shepard, Quincy, second vice president; Mrs. Rudolph Schwartz, Miami, secretary; and Mrs. E. B. McChesnay, High Springs, reelected treasurer.

Immediate past president of the Council is Mrs. O. L. Ashmore, Dunnedin.

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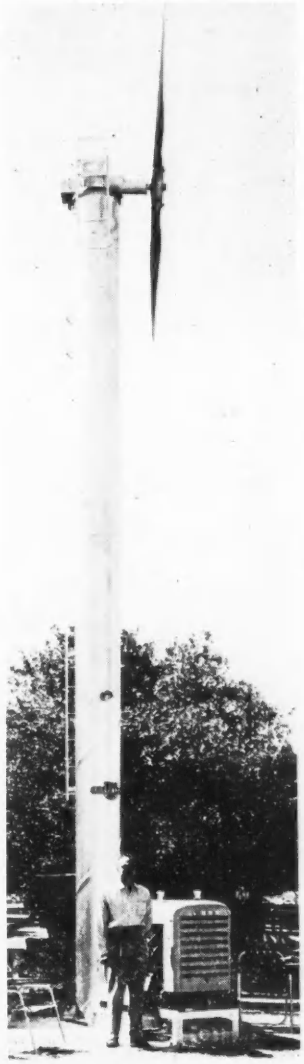

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